

**CLAIMS**

It is claimed:

1. A system comprising:
  - a testing system to test whether a device under test conforms to a physical layer communications standard, the testing system having
    - a plurality of lane cards to transmit data on a plurality of data lanes to the device under test according to the physical layer communications standard
    - a deskew card to prepare deskew information independent of the lane cards according to the physical layer communications standard
    - a computer coupled to the testing system.
2. The system of claim 1 wherein the testing system is further to generate arbitrarily long test patterns on the data lanes.
3. The system of claim 1 wherein the testing system is further to generate test patterns on each of the data lanes independent of the other data lanes.
4. The system of claim 1 wherein the number of data lanes is 16 and the physical layer communications standard is the SFI-5 standard.
5. The system of claim 1 wherein the lane cards each transmit data on two data lanes.
6. The system of claim 1 wherein the lane cards each include two lane Field Programmable Gate Arrays.

7. The system of claim 1 wherein the computer includes software which when executed provides a management user interface that allows a user to access the testing system.
8. A testing system to test whether a system under test conforms to a physical layer communications standard, the testing system comprising:
  - a plurality of lane cards to transmit data on a plurality of data lanes to the system under test according to the physical layer communications standard and to receive data on the plurality of data lanes from the system under test,
  - a deskew card to prepare outgoing deskew information for outgoing data independent of the lane cards according to the physical layer communications standard and to evaluate incoming deskew information included with received incoming data independent of the lane cards according to the physical layer communications standard.
9. The testing system of claim 8 wherein the testing system generates arbitrarily long test patterns on the data lanes.
10. The testing system of claim 8 wherein the testing system generates test patterns on each of the data lanes independent of the other data lanes.
11. The testing system of claim 8 wherein the number of data lanes is 16, and the physical layer communications standard is the SFI-5 standard.
12. The testing system of claim 8 wherein each lane card transmits data on two data lanes.
13. The testing system of claim 8 wherein each of the lane cards include two lane Field Programmable Gate Arrays.

14. The testing system of claim 8 having a computer coupled thereto.
15. The testing system of claim 14 wherein the computer includes software which when executed provides a management user interface that allows a user to monitor and control the testing system.
16. A method for transmitting test data according to a physical layer communications standard comprising:
  - starting a lane counter
  - selecting a selected test pattern based on the lane counter
  - selecting a pattern seed based on the selecting and the lane counter
  - generating a current generated test pattern based on the pattern seed and the selected test seed
  - transmitting the current generated test pattern
  - generating a next generated test pattern based on the selected test pattern and the current generated pattern
  - storing the next generated test pattern
17. The method of claim 16 further comprising:
  - incrementing the lane counter
  - selecting the selected test pattern based on the lane counter
  - preparing the pattern seed based on the selected test pattern
  - generating the current generated pattern based on the selected test pattern and the next generated test pattern

evaluating whether to transmit the current generated pattern or a header based on the lane, the evaluating based on the lane counter

transmitting either the current generated pattern or the header based on the evaluating.

18. The method of claim 17 wherein the evaluating comprises selecting the header when a value of the lane counter corresponds to a deskew lane, and selecting the current generated pattern when a value of the lane counter corresponds to a data lane.

19. A method for receiving test data according to a physical layer communications standard comprising:

starting a lane counter

receiving incoming data

synchronizing the incoming data

selecting a test pattern based on a value of the lane counter

evaluating whether to use the incoming data or a stored next generated pattern to generate an anticipated pattern

generating an anticipated pattern based on the evaluating and the test pattern

comparing the generated anticipated pattern with the incoming data

flagging an error condition if the generated anticipated pattern and the incoming data do match based on the comparing

20. The method of claim 19 further comprising:

generating the next pattern based on the test pattern and the anticipated generated pattern

storing the next generated pattern as a stored next generated pattern

incrementing the lane counter

**21.** A transmitter circuit to transmit deskew data conforming to a physical layer communications standard, the transmitter circuit comprising:

a lane counter coupled to a pattern select unit a pattern seed unit, and a current pattern unit, the lane counter to provide a lane value from 0 to 16 and to increment the lane value from 0 to 16

the pattern select unit to select a pattern based on the lane value and to provide a selected pattern to the pattern seed unit, a current pattern generation unit and a next pattern generation unit

the current pattern unit to store a next generated pattern generated by the next pattern generation unit as a stored current pattern, and to receive the lane value from the lane counter

the pattern seed unit to provide a pattern seed to a first mux based on the selected pattern and the lane value

the first mux to select between the pattern seed received from the pattern seed unit and the stored current pattern received from the current pattern unit, and to provide input to the current pattern generation unit

the current pattern unit to generate a current generated pattern based on input received from the first mux and the selected pattern

the next pattern generation unit to generate the next generated pattern based on the current generated pattern and the selected pattern

a second mux to select between transmitting a header or the current generated pattern based on the lane value.

**22.** A receiver circuit to receive deskew data transmitted according to a physical layer communications standard, the receiver circuit comprising:

a receive line to receive incoming data, the receive line coupled to a frame synchronization unit and a compare unit

the frame synchronization unit to identify a data location in the incoming data, and to provide the data location to a lane counter and a pattern state machine

a lane counter to provide a lane value and to increment the lane value from 0 to 16, the lane counter to provide the lane value to a pattern select unit, a current pattern unit, and the pattern state machine

the pattern select unit to select a selected pattern based on the lane value and to provide the selected pattern to an anticipated pattern generation unit and a next pattern generation unit

the current pattern unit to receive a next generated pattern from the next pattern generation unit and store the next generated pattern as a current pattern, the current pattern unit to the current pattern to a mux based on the lane value

the mux to select between the current pattern and the incoming data based on a output from the pattern state machine

the compare unit to evaluate whether the incoming data corresponds to the anticipate generated pattern, and to provide a result and the incoming data to the pattern state machine.